

इंटरनेट

मानक

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Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

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Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 15194 (2002): Pitch-Mastic Flooring for Industries Handling Heavy Hydrocarbon Products Like Kerosene, Diesel and Furnace Oil - [CED 5: Flooring, Wall Finishing and Roofing]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

भारी हाईड्रोकार्बन उत्पादन जैसे मिट्टी का तेल, डीजल एवं
फुर्नेस तेल से जुड़ी उद्योग की फ्लोरिंग के लिए
पिच मास्टिक — विशिष्टि

Indian Standard

PITCH-MASTIC FLOORING FOR INDUSTRIES
HANDLING HEAVY HYDROCARBON PRODUCTS
LIKE KEROSENE, DIESEL AND FURNACE OIL—
SPECIFICATION

ICS 91.040.20; 91.100.50

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Flooring, Wall Finishing and Roofing Sectional Committee had been approved by the Civil Engineering Division Council.

This standard has been formulated with a view to laying down a new specification for pitch-mastic flooring for area where heavy hydrocarbon products like kerosene, diesel oil, furnace oil are handled. This standard will also be applicable to petrol pumps, diesel depot of large consumer of these products as well as factories handling hydrocarbon products. It is also applicable to road surfaces prone to oil spillage by automobiles.

The composition of the Committee responsible for formulation of this standard is given at Annex E.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PITCH-MASTIC FLOORING FOR INDUSTRIES HANDLING HEAVY HYDROCARBON PRODUCTS LIKE KEROSENE, DIESEL AND FURNACE OIL — SPECIFICATION

1 SCOPE

1.1 This standard specifies requirements of pitch-mastic flooring in industries handling kerosene, diesel oil, furnace oil and other heavy hydrocarbons products.

1.2 This standard is also applicable to petrol pumps, diesel depot of large consumer of these products as well as factories handling hydrocarbon products.

1.3 This standard is also applicable to road surfacing prone to oil spillage by automobiles.

2 REFERENCES

The Indian Standards given at Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

3 TERMINOLOGY

3.1 For the purpose of this standard the terminologies given in IS 334 as well as those given below shall apply.

3.1.1 *Coal Tar Pitch* — The fusible solid or semi-solid product remaining after the distillation of tar produced as a by-product of the coal carbonization as specified in IS 216.

3.1.2 *Flux* — An anthracene oil suitable for softening the coal tar pitch as per IS 218.

3.1.3 *Absorbent Filler* — A fine material with bulk density in benzene of 0.5 to 0.9. Lime stone, dust powder and slaked lime finer than 75-micron sieve may be used as filler.

4 MATERIALS

4.1 The constituents of the binder shall be selected from the following:

- a) High temperature pitch prepared either by steam blowing a medium soft pitch (*R* and *B* of 78°C) at a temperature not higher than 350°C or by prolonging the passage of steam in the normal distillation of a coal tar which would otherwise yield a medium soft pitch. In

no circumstances shall, if be prepared by fluxing a pitch of higher softening point with a coal tar oil. The prepared pitch shall conform to the specifications given in col 2 of Table 1.

- b) Low temperature pitch obtained as residue from the distillation of tar produced as a by-product of the low temperature carbonization of coal. The pitch shall conform to the requirements of col 2 of Table 1.
- c) Flux conforming to the requirements given in col 3 of Table 1.

Table 1 Properties of Constitution of Binder
(Clause 4.1)

Sl No.	Properties	Pitch Anthracene			Method of Tests, Ref to IS No.
		a	b	c	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Specific gravity, 15°C/15°C	1.25-1.35	1.15-1.20	0.98-1.05	1202
ii)	Softening point (R&B), °C	85-90	68-74	—	1205
iii)	Matter insoluble in benzene/toluene, Max	35	5.0	1.0	1215
iv)	Ash content, Max	0.8	0.8	0.5	1220
v)	Water percent, Max	0.5	0.5	0.5	1211
vi)	Distillation below 300°C	—	—	—	1213

4.2 The actual properties of the binder used in preparation of mastic are given in Table 2.

4.2.1 The binder shall have the properties given in Table 2 and shall also conform to the following:

- a) It shall show no flocculation or precipitation of resins or insoluble matter; and
- b) When tested in the manner described in Annex B, it shall not produce offensive fumes.

4.3 Aggregates

The aggregates shall consist of fine aggregate, coarse aggregate as follows:

- a) *Fine aggregate* — The fine aggregate shall consist of naturally occurring lime stone, rock ground to a grading as given in Table 3,

It shall have calcium carbonate content of not less than 85 percent by weight.

- b) *Absorbent filler* — If required shall be used upto 10 percent by weight of total fine aggregate.
- c) *Coarse aggregate* — The coarse aggregate shall consist of graded siliceous or igneous material obtained from natural deposits either directly or by crushing, screening or other mechanical process. It shall be as free from dust as applicable.

Table 2 Actual Properties of the Binder
(Clause 4.2)

Sl No.	Properties	Test Value	Method of Test, Ref to IS No.
(1)	(2)	(3)	(4)
i)	Softening point (R&B), °C	60-70	1205
ii)	Matter insoluble in benzene/toluene, percent, <i>Max</i>	30	1215
iii)	Ash Content, <i>Max</i> <i>Min</i>	12 5	1220
iv)	Water content percent, <i>Max</i>	0.5	1211
v)	Distillation below 300°C	Nil	1213

The percentage and size of such chippings on grit incorporated in pitch-mastic will be dependent primarily upon the thickness of the finished work. The size shall be within the limits set out in Table 4. The percentage shall be such that the total percentage of material retained on 600-micron sieve and analysis of the pitch-mastic as laid down shall fall within the appropriate limits set forth in col 2 of Table 4.

5 MANUFACTURE AND COMPOSITION

5.1 The manufacture of pitch-mastic is done in two stages. In the first stage the filler and fine aggregate shall be mixed thoroughly and heated to 150°C to 170°C. Required quality of pitch heated to 120°C–130°C shall be added to hot fine aggregate, filler blend. They shall be mixed and cooked in a mastic cooker for 2-3 h till the two materials are intimately mixed. During mixing and cooking care shall be taken that temperature at no stages goes above 170°C. The requisite percentage of course aggregate shall be incorporated either during manufacture of the pitch-mastic or during remelting at the site of work. When material is not required for immediate use it shall be cast into blocks weighing about 25 kg.

5.2 Remelting at Site

The pitch-mastic blocks shall be broken into pieces of convenient size (40–50 mm) and then carefully remelted preferably in a mastic cooker. At this stage

the coarse aggregates, if not already added in successive portions till complete charge is thoroughly incorporated. As far as possible the coarse aggregate shall be added in dry state. If the coarse aggregates have been added during manufacture, no further addition of coarse aggregate shall be necessary on remelting. At no time the temperature of the molten pitch-mastic exceed 170°C.

Table 3 Grading of Fine Aggregate
(Clause 4.3)

Sl No.	Sieve Range	Percent
(1)	(2)	(3)
i)	Passing 75-micron IS Sieve	45-55
ii)	Passing 212-micron IS Sieve and retained on 75-micron IS Sieve	10-30
iii)	Passing 600-micron IS Sieve and retained on 212-micron IS Sieve	10-30
iv)	Passing 2.36-micron IS Sieve and retained on 600-micron IS Sieve	5-20
v)	Retained on 2.36 mm IS Sieve	Nil

Table 4 Limit and Size of Coarse Aggregate
(Clause 4.3)

Sl No.	Thickness of Carpet, mm	Percent	Size
(1)	(2)	(3)	(4)
i)	16	15-20	Retained on 600-micron IS Sieve not less than 85 percent Passing 3 mm IS Sieve not less than 95 percent
ii)	19	20-30	Retained on 600-micron IS Sieve not less than 85 percent Passing 3 mm IS Sieve not less than 95 percent
iii)	25	20-30	a) Igneous rock retained on 2.36 mm IS Sieve not less than 75 percent. Passing 6 mm IS Sieve not less than 90 percent b) Siliceous grit retained on 600-micron IS Sieve not less than 85 percent. Passing 6 mm IS Sieve not less than 90 percent

5.3 If required to be verified, the mastic block shall show on analysis a composition within the limits set forth in Table 5. The analysis of the pitch-mastic shall be done in accordance with the method given in Annex C.

5.3.1 As an anti-skid measure, the pitch-mastic after spreading and while still hot and in plastic condition shall be covered with a layer of coarse aggregate of 10 to 12 mm size depending on thickness of mastic layer at the rate of 7.5 kg to 10 kg/m² for 14 mm size and 10 to 13 kg/m² for 20 mm size. The coarse aggregate prior to application shall be coated with 2 to 3 percent by weight or RT - 4 and 2 to 3 percent filler. The coarse aggregate shall be rolled or otherwise pressed into the surface of mastic layer.

**Table 5 Composition of Pitch-Mastic
(Without Coarse Aggregates)**
(Clause 5.3)

Sl No.	Requirements	Percentage of Mastic Without Coarse Aggregates	
		Minimum	Maximum
(1)	(2)	(3)	(4)
i)	Soluble binder	14	17
ii)	Insoluble material:		
a)	Passing 75-micron IS Sieve	40	56
b)	Passing 212-micron IS Sieve and retained on 75-micron IS Sieve	8	25
c)	Passing 600-micron and retained on 212-micron IS Sieve	8	32

6 HARDNESS NUMBER

6.1 For floors which are from 16 mm to 19 mm thick laid inside premises and not exposed to weather, the hardness of the materials as laid shall be not more than 15 and not less than 8 at 35°C. For floors over 19 mm thick and floor laid other than inside premises and not exposed to weather the hardness number of material as laid shall be agreed between the purchaser and the pitch-mastic contractor.

6.2 The hardness number shall be determined in accordance with the method specified in Annex D.

7 SAMPLING AND CRITERIA FOR CONFORMITY

7.1 During Discharge from Mixer

7.1.1 Three or more separate portions of not more than 5 kg each of bitumen mastic shall be taken at intervals during the discharge of the mixer. The specimen shall include portions taken at beginning or at the end of discharge except in cases where the practice of returning to the mixer, the first and last portions discharged, is followed. The portions shall then be thoroughly mixed at a temperature of 150°C to 170°C. The sample shall be floated out on an iron plate with the aid of a wooden float to a thickness not less than 25 mm. While still warm the specimen shall be loosened from the plate and a representative portion weighing not less than 5 kg if ungritted (without coarse aggregate) and not less than 10 kg if gritted (with coarse aggregate) shall be forwarded to the laboratory for examination with full particulars as given in 7.3.

7.2 Block

Material in block form shall be sampled by taking approximately equal amounts in pieces not less than 6 blocks taken at random. The total specimen of not

less than 5 kg if ungritted and not less than 10 kg if gritted shall be forwarded to the laboratory for examination with full particulars as given in 7.3.

7.3 Labelling

The specimen shall be adequately identified and the identification shall be provided for reference to schedule which shall be sent giving the appropriate items for the following:

- a) Name and address of authority giving instructions for the examination to be carried out;
- b) Sample number;
- c) Type of material;
- d) Type of binder;
- e) Type of aggregates;
- f) Specification with which the material is intended to comply;
- g) Name and location of mixing plant;
- h) Sample taken before or after laying;
- j) Date of mixing, if known;
- k) Date of laying, if known;
- m) Date of sampling;
- n) Site where laid;
- p) Position from which sample was taken;
- q) Number and nominal thickness of course;
- r) Nature of foundation;
- s) Nature of surface treatment, if any; and
- t) Tests to be made.

7.3.1 To facilitate testing and interpretation of test results, it is essential that as much information as position should be given to the laboratory.

7.4 Criteria for Conformity

The bitumen mastic shall be considered as conforming to this specification if the requirements given in 5.3, 6.1 and 6.2 are satisfied.

8 MARKING

8.1 If cast into blocks for storage, the date of manufacture and name of the manufacturer shall be indicated suitably.

8.2 The pitch-mastic flooring may also be marked with the Standard Mark.

8.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
216 : 1961	Specification for coal tar pitch (<i>first revision</i>)		of water content (Dean and Stark method) (<i>first revision</i>)
218 : 1983	Specification for creosote oil for use as wood preservatives (<i>second revision</i>)	1213 : 1978	Method for testing tar and bituminous materials — Distillation test (<i>first revision</i>)
245 : 1988	Specification for trichloroethylene, technical (<i>third revision</i>)	1215 : 1978	Method for testing tar and bituminous materials — Determination of matter insoluble in toluene (<i>first revision</i>)
334 : 1982	Glossary of terms relating to bitumen and tar (<i>second revision</i>)	1220 : 1978	Method for testing tar and bituminous materials — Determination of volatile matter content (<i>first revision</i>)
1202 : 1978	Method for testing tar and bituminous materials — Determination of specific gravity (<i>first revision</i>)	1840 : 1961	Specification for benzene, reagent grade
1205 : 1978	Method for testing tar and bituminous materials — Determination of softening points (<i>first revision</i>)	2386	Methods of test for aggregates for concrete: Part 1 Particle size and shape
1211 : 1978	Method for testing tar and bituminous materials — Determination	(Part 1) : 1963	

ANNEX B

[Clause 4.2.1(b)]

FUMES TEST

B-1 METHOD

Place 300 g of the material under test in a round bottomed basin about 4.5 inches (114 mm) in diameter. Then heat on a sand-bath, stirring constantly, at such a rate that a temperature of 180°C is reached in not more than 30 min.

When the required temperature has been reached, discontinue heating and test the contents of the basin immediately by smell and by the effect of any fumes on the eyes, respiratory system and skin. Carryout the test within approximately 2 inches (51 mm) of the surface of the material immediately after stirring.

ANNEX C

(Clause 5.3)

METHOD FOR DETERMINATION OF BINDER CONTENT AND
FINE AGGREGATES IN PITCH-MASTIC

C-1 APPARATUS

C-1.1 The apparatus shall consist of a simple hot extractor consisting of the following.

C-1.1.1 A cylindrical container as shown in Fig. 1 shall be made from brass gauze of about 1.70 mm aperture width which is rested on, or suspended from, three pegs inside a brass or welded iron pot as shown in Fig. 2. Alternatively, the brass gauze container may rest on a suitable stool standing in the bottom of the pot. The pot is flanged and fitted with a cover and suitable jointing gasket. The essential features of construction are indicated in Figs. 1, 2 and 3, it is advantageous to have containers and pots of more than one size, the size employed being appropriate to the quantity of material taken for analysis.

C-1.1.2 *Reflex Condenser*

There should be sufficient flow of cold water to condense the solvent.

C-1.1.3 A suitable heater, such as an electric hot-plate or a gas ring.

C-1.1.4 A suitable filter paper which shall not allow any filler material to pass through.

C-2 SOLVENT

C-2.1 The solvent shall be benzene (*see* IS 1840) or trichloroethylene (*see* IS 245).

NOTE — When chlorinated solvents are recovered by distillation for further use, care shall be taken to ensure that the solvent satisfies the requirements of the appropriate standard. In particular, acidity may develop, and a useful precaution is to store the solvent over quick lime in coloured glass or metal containers.

C-3 SIZE OF SAMPLE

C-3.1 About 6 kg of the bitumen mastic shall be taken for the test.

C-4 PROCEDURE

C-4.1 The determination shall be made in duplicate. The filter paper shall be dried at 100°C to 120°C, placed in a large weighing bottle or jar, cooled in a desiccator and weighed. The filter paper shall then be fitted into the gauze cylinder to form a complete lining. The sample shall be warmed just sufficiently to facilitate breaking up, and a representative portion, obtained if possible by quartering, shall be weighed to the nearest 0.05 percent of the weight taken and transferred without loss to the filter paper and placed inside the gauze cylinder. Alternatively, the cylinder and its paper lining may be placed on the balance and the material weighed into it. The gauze cylinder shall then be placed inside the pot and 800 to 1 500 ml of the solvent, according to the size of the extractor shall be poured over the sample. The cover shall be bolted on with the dried gasket, in position. After fixing the reflux condenser, heat shall be applied to the pot and so adjusted as to avoid intense local heating, but at

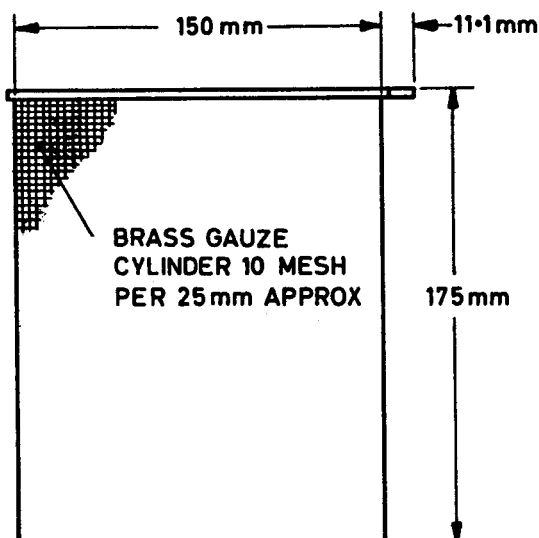
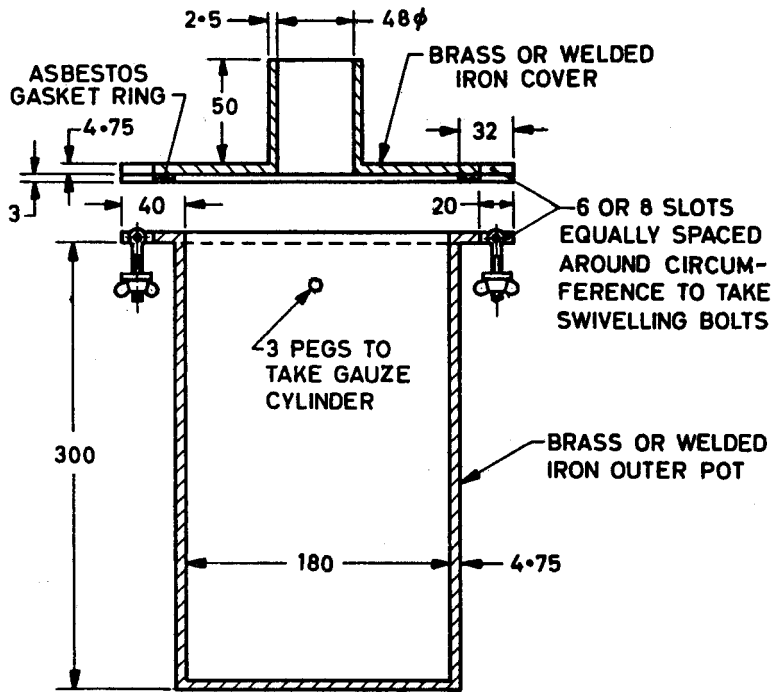


FIG. 1 TYPICAL BRASS GAUZE CONTAINER



All dimensions in millimetres.

FIG. 2 TYPICAL HARD-SOLDERED BRASS OR WELDED IRON POT

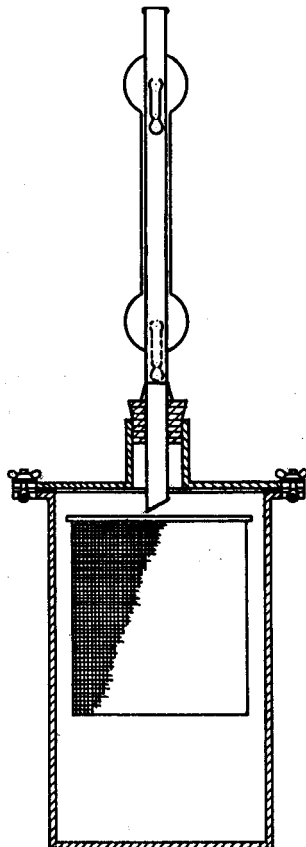


FIG. 3 TYPICAL ASSEMBLED APPARATUS

the same time to ensure a steady reflux action of 2 to drops per second falling from the end of the condenser.

Heating shall be continued until extraction is complete.

The washed mineral aggregate, with its container shall then be removed and dried to constant weight at 100°C to 120°C such that successive weighing at half hourly intervals do not exceed 0.05 percent. The cylinder and contents shall be cooled in a desiccator before weighing. In order to correct for any fine material present in the solution at the end of the test, the solvent shall be evaporated off, the residue weighed, and a representative portion of it (between 2 to 3 g) treated with the solvent and filtered through a sintered silica filtering crucible or filter paper. In the case of materials containing high filler content the whole of the solution at the end of the test should be filtered or centrifuged. The aggregate shall then be graded according to the procedure laid down in IS 2386 (Part 1).

The binder content B shall be calculated on the dry sample by means of the following formula:

$$B, \text{ per cent by mass} = 100 \frac{W_1 - (W_2 + W_3)}{W_1}$$

where

W_1 = mass of sample in g,

W_2 = mass of recovered aggregate in gauge cylinder in g, and

W_3 = mass of residue obtained on evaporating the solvent in g.

C-5 REPORTING OF RESULTS

C-5.1 If the difference between the results obtained by the duplicate determinations exceeds 0.4, they shall be discarded and the test repeated. If the difference does not exceed 0.4, the individual values and the mean value shall be reported.

ANNEX D

(Clause 6.2)

METHOD FOR DETERMINING HARDNESS NUMBER

D-1 HARDNESS NUMBER

D-1.1 The hardness number is the figure denoting the depth, in hundredths of a centimetre, to which a flat-ended indentation pin in the form of a steel rod 6.35 mm in diameter will penetrate the mastic under a load of 31.7 kg, applied for one minute, the temperature being maintained at 35°C ± 0.5°C or 45°C ± 0.5°C as specified. The load is equivalent to 100 kg/cm² and is conveniently applied by means of a lever giving a suitable mechanical advantage.

D-2 APPARATUS

D-2.1 The apparatus employed should be capable of fulfilling the above requirements accurately. One convenient form of apparatus is shown in Fig. 4.

D-3 METHOD

D-3.1 In order to ensure that the test results are reproducible, particular attention is called to the

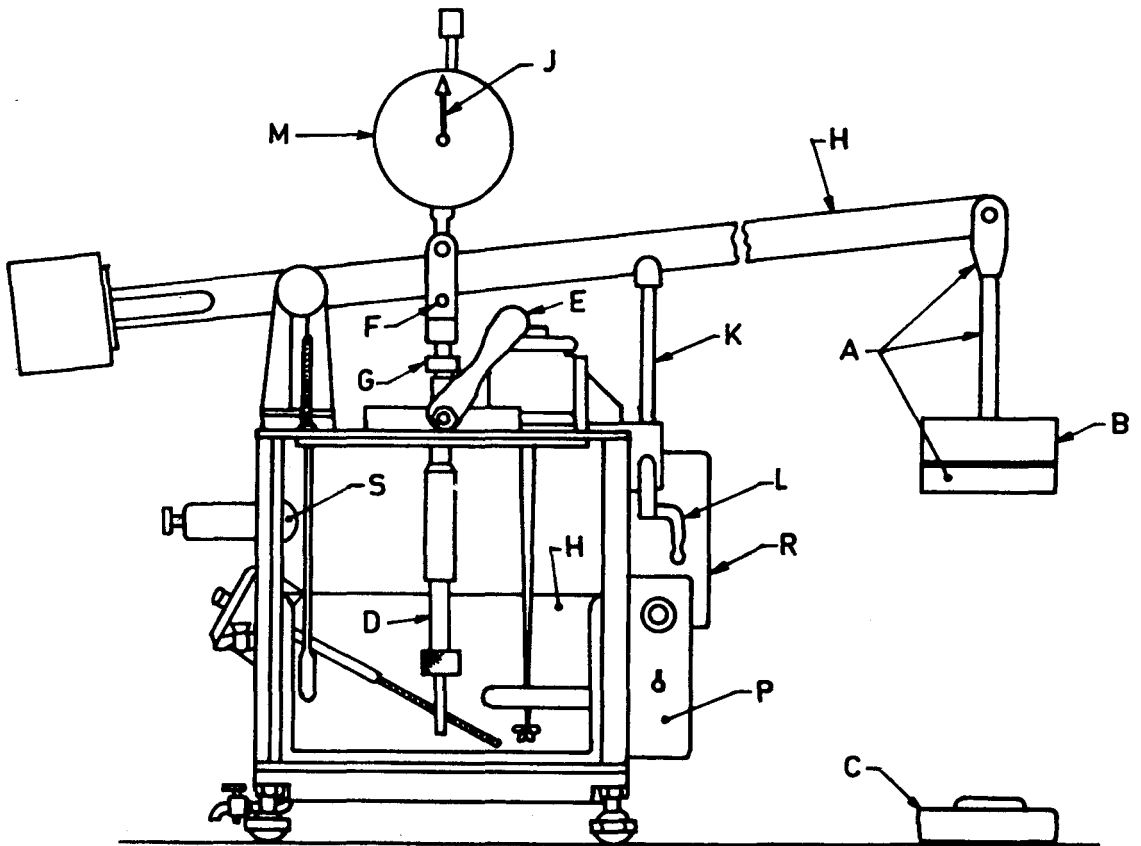
following points.

D-3.1.1 Sample

In preparing samples for test, the mastic as laid shall be filled directly from the mixer at the time of laying, in to moulds which are not less than 100 mm in diameter or 100 mm square, and float finished. The sample, which shall be taken in duplicate, shall be moulded to a thickness of 25 mm. Where it is necessary to make a test on samples cut from the floor, special precautions should be taken to ensure that the sample is of uniform thickness and that the base is level. The samples should not be remelted.

D-3.1.2 Test Temperature

For the purpose of this standard, the sample shall be cooled for not less than three hours in air or not less than one hour in cold running water. It shall then be immersed in water at the test temperature (± 0.1°C) for at least one hour immediately prior to testing.



- | | | | |
|---|-----------------------|---|--|
| A | Yoke, stalk and tray | J | Indicating needle |
| B | Weight (central hole) | K | Beam support yoke |
| C | Weight (slotted) | L | Support bracket |
| D | Indenter pin spindle | M | Calibrated dial |
| E | Lock lever | N | Water bath |
| F | Spindle head | P | Controls for water stirrer |
| G | Adjusting nut | R | Controls for heater blade and thermostat |
| H | Beam | S | Bath illuminator |

FIG. 4 TYPICAL APPARATUS FOR HARDNESS TESTING

D-3.1.3 Testing

The sample shall then be transferred to the test machine where it shall again be immersed in water maintained at the test temperature ($\pm 0.1^\circ\text{C}$) throughout the test. The indenter pin shall then be adjusted lightly but firmly in contact with the surface of the sample, the pressure being no greater than is necessary to prevent lateral movement in the specimen. The requisite load shall then be applied for exactly 60 s and the depth of indentation recorded in tenths of millimetre.

D-3.1.4 Test Results

Test points shall not be less than 25 mm apart and not less than 25 mm from the edge. At least five readings shall be taken and the results averaged. If any result differs from the mean by more than two hardness number units, it shall be rejected and the average of the remainder determined, except that if there are fewer than four results to be averaged the sample shall be discarded and the test made on another sample.

ANNEX E

(Foreword)

COMMITTEE COMPOSITION

Flooring, Wall Finishing and Roofing Sectional Committee, CED 5

<i>Organization</i>	<i>Representative(s)</i>
In personal capacity (A-39/8, DDA Flats, Munirka, New Delhi 110067)	SHRI P. B. VIJAY (<i>Chairman</i>)
All India Brick & Tile Manufacturers Federation, New Delhi	SHRI S. P. BANSAL
Bhor Industries Limited, Mumbai	SHRI K. L. SHAH SHRI R. K. PATEL (<i>Alternate</i>)
Builders' Association of India, Mumbai	SHRI W. R. TALWAR SHRI PAWAN TALWAR (<i>Alternate</i>)
Building Materials & Technology Promotion Council, New Delhi	SHRI J. SENGUPTA
CEAT Limited, Hyderabad	SHRI S. SUNDRAM SHRI RAJENDER PAL (<i>Alternate</i>)
Central Building Research Institute, Roorkee	SHRI LATHIKA JAISINGH SHRI S. K. MITTAL (<i>Alternate</i>)
Central Public Works Department, New Delhi	CHIEF ENGINEER (CSQ)
Engineer-in-Chief's Branch, New Delhi	SHRIMATI UPINDER KAUR SHRIMATI RIVOO MAHINDRU (<i>Alternate</i>)
Hindustan Zinc Limited, Udaipur	SHRI C. S. MEHTA
India Meteorological Department, New Delhi	SHRI A. V. R. K. RAO SHRI S. C. GOYAL (<i>Alternate</i>)
Indian Institute of Technology, Kharagpur	MS RAJNI AHUJA
Institution of Engineers (India) Limited, Kolkata	SHRI P. B. VIJAY
Maharashtra Engineers Research Institute, Nasik	CHIEF ENGINEER & DIRECTOR SCIENTIFIC RESEARCH OFFICER (<i>Alternate</i>)
Ministry of Railways (RDSO), Lucknow	EXECUTIVE ENGINEER (P&D-II) EXECUTIVE ENGINEER (P&D-I) (<i>Alternate</i>)
Modern Tiles & Marble, New Delhi	SHRI A. C. KAPOOR SHRI SUBHASH KAPOOR (<i>Alternate</i>)
National Test House, Kolkata	SHRI D. K. KANUNGO SHRI R. KAPOOR (<i>Alternate</i>)
Prodorite Anti-corrosives Limited, Chennai	SHRI M. ANNAMALAI DR P. SACHINDRAPAL (<i>Alternate</i>)
Projects & Development India Limited, Sindri	DR P. K. JAISWAL SHRI A. K. PAL (<i>Alternate</i>)
Public Works Department, Chennai	SUPERINTENDING ENGINEER (P&D) EXECUTIVE ENGINEER (<i>Alternate</i>)
Rashtriya Pariyojna Nirman Nigam Limited, New Delhi	SHRI R. C. KEHRAM SHRI B. B. KANWAR (<i>Alternate</i>)

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<i>Organization</i>	<i>Representative(s)</i>
Steel Authority of India Limited, Ranchi	SHRI S. SAH SHRI RAVICHANDRAM (<i>Alternate</i>)
STP Limited, Kolkata	SHRI T. K. ROY SHRI B. B. BANERJEE (<i>Alternate</i>)
In personal capacity (C-474, Sushant Lok, Phase I, Gurgaon, Haryana)	SHRI O. P. RATRA
In personal capacity (5-9-101/J, 1st Floor, Public Garden Road, Hyderabad 500001, Andhra Pradesh)	SHRI MUZAFFAR ALI KHAN
BIS Directorate General	SHRI S. K. JAIN, Director and Head (Civ Engg) [Representing Director General (<i>Ex-officio</i>)]

Member Secretary
SHRI R. K. GUPTA
Joint Director (Civ Engg), BIS

Bituminous Flooring, Wall Covering and Roofing Subcommittee, CED 5 : 5

In personal capacity (B-190, Sector 55, Noida 201301, Uttar Pradesh)	SHRI R. S. SHUKLA (<i>Convener</i>)
Bharat Petroleum Corporation Limited, Mumbai	SHRI P. C. SRIVASTAVA SHRI J. A. JANAJ (<i>Alternate</i>)
Building Materials & Technology Promotion Council, New Delhi	SHRI J. SENGUPTA
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This Indian Standard has been developed from Doc : No. CED 5 (5174).

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